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**U.S. DEPARTMENT OF COMMERCE  
NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY  
(formerly National Bureau of Standards-NBS)  
OFFICE OF STANDARDS SERVICES**

**COMMERCIAL STANDARD CS232-60  
INDUSTRIAL WIRE CLOTH**

Commercial Standard CS232-60, Industrial Wire Cloth, was withdrawn by the U.S. Department of Commerce in July 1972.

\* \* \* \* \*

ASTM E437, Standard Specification for Industrial Wire Cloth and Screens (Square Opening Series) was used to replace CS232-60. -The following standard may also be of interest: ASTM E11, Standard Specification for Wire Cloth and Sieves for Testing Purposes.

ASTM can provide additional assistance and information on their standards/documents and/or copies.

**Contact: American Society for Testing and Materials (ASTM)**  
100 Barr Harbor Drive  
West Conshohocken Pennsylvania 19428-2959, USA  
General Inquiries and Orders: (610) 832-9500/-9585  
Fax: (610) 832-9555  
**ASTM Committee E29, Particle Size Measurement**  
(610) 832-9718; Fax: (610) 832-9666

The staff manager for the Technical Committee E29 can provide further guidance and assistance for information on other standards and/or contacts for committees/subcommittees (example: E29.01 sieves, sieving methods and screening media).

\* \* \* \* \*

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(AWPA formed by merger of Specialty Wire Association, and Independent Wire Producers Association)

File Copy  
CS 232-6

**DEPARTMENT OF COMMERCE**  
National Bureau of Standards  
**VOLUNTARY PRODUCT STANDARDS**  
Notice of Action on Proposed  
Withdrawal

In accordance with the provisions of § 10.12 of the Department's published "Procedures for the Development of Voluntary Product Standards" (15 CFR Part 10, as amended; 35 F.R. 8349 dated May 28, 1970), notice is hereby given of the withdrawal of 66 standards identified below. Each of these standards, Commercial Standard (CS) and Simplified Practice Recommendation (SPR), has been found to be obsolete, no longer technically adequate, no longer acceptable to and used by the industry, or otherwise not in the public interest.

- CS 16-29 Wallpaper.
- CS 26-30 Aromatic Red Cedar Closet Lining.
- CS 27-36 Mirrors.
- CS 28-46 Cotton Fabric Tents, Tarpaulins, and Covers.
- CS 43-32 Grading of Sulphonated (Sulphated) Oils Saponifiable Types.
- CS 61-51 Venetian Blinds (Grade A Custom-Made).
- CS 73-61 Old Growth Douglas Fir, Sitka Spruce, and Western Hemlock Doors.
- CS 76-39 Hardwood Interior Trim and Molding.
- CS 78-40 Ground-and-Polished Lenses for Sun Glasses.
- CS 79-40 Blown, Drawn, and Dropped Lenses for Sun Glasses.
- CS 89-40 Hardwood Stair Treads and Risers.
- CS 92-41 Cedar, Cypress and Redwood Tank Stock Lumber.
- CS 119-45 Dial Indicators (For Linear Measurements).
- CS 133-46 Woven Wire Netting.
- CS 140-47 Testing and Rating Conveyors.
- CS 141-47 Sine Bars, Blocks, Plates and Fixtures.
- CS 159-49 Sun Glass Lenses Made of Ground and Polished Plate Glass Thereafter Thermally Curved.
- CS 160-49 Wood Fiber Blanket Insulation (For Building Construction).
- CS 161-59 "Standard Grade" Hot Dipped Galvanized Ware (Coated After Fabrication).
- CS 162-49 Tufted Bedspreads.
- CS 167-50 Automotive and General Service Copper Tube.
- CS 168-50 Polystyrene Plastic Wall Tiles, and Adhesives for Their Application.
- CS 169-59 Galvanized Ware Fabricated from Pregalvanized Steel Sheets (For Standard Grade Items Only).
- CS 206-57 Solvent Welded (SWP Size) Cellulose-Acetate Butyrate Pipe.
- CS 225-59 Method of Rating Commercial and Industrial Type Vacuum Cleaners, Portable and Mobile Types.
- \* CS 232-60 Industrial Wire Cloth.
- CS 244-62 Roof Drainage Products.
- CS 252-63 TFE-Fluorocarbon (Polytetrafluoroethylene) Resin Electrical Insulating Tubing.

- CS 268-64 Aluminum Nails.
- CS 267-65 Steel Medicine Cabinets.
- SPR 11-36 Bed Blanket Sizes.
- SPR 22-40 Paper (Basic Sheet Sizes).
- SPR 31-63 Loaded Shot Shell.
- SPR 37-38 Commercial Forms (Invoice, Purchase Order and Inquiry).
- SPR 42-61 Grocers' Paper Bags.
- SPR 47-54 Cut Tacks and Small Cut Nails.
- SPR 51-29 Chasers for Self-Opening and Adjustable Die Heads.
- SPR 53-63 Steel Spirals for Reinforced Concrete Columns.
- SPR 62-63 Metallic Cartridges.
- SPR 76-40 Ash Handles.
- SPR 81-28 Binders' Board.
- SPR 90-62 Hack-Saw Blades.
- SPR 91-32 Glass Containers for Preserves, Jellies and Apple Butter.
- SPR 129-59 Merchandise Paper Bags.
- SPR 146-52 Corrugated and Solid-Fiber Boxes for Canned Fruits and Vegetables.
- SPR 150-34 Copper Wire Nails.
- SPR 155-49 Cans for Fruits and Vegetables (Names, Dimensions, Capacities and Designated Use).
- SPR 162-35 Packaging of Air Brake (Electric Railway) Parts.
- SPR 173-54 Stock Folding Boxes for Millinery.
- SPR 197-51 Glass Containers for Marshchino Cherries.
- SPR 208-55 Fluid-Milk Cans.
- SPR 213-45 Asphalt Roll Roofing and Asphalt and Tar-Saturated Felt Products.
- SPR 217-49 Copper Water Tube, and Copper and Brass Pipe.
- SPR 218-46 Paper Tubes for Packaging Milk Bottle Caps.
- SPR 223-47 Wire Nails and Staples.
- SPR 228-47 Pallets for Handling Groceries and Packaged Merchandise.
- SPR 235-48 Copper and Copper-Alloy Round Seamless Tube.
- SPR 241-50 Copper and Copper-Alloy Rod.
- SPR 246-51 Wooden Kegs for Nails.
- SPR 248-52 Packaging of Standard Malleable Iron Screwed Pipe Fittings, Black or Galvanized.
- SPR 250-53 Standard Drug Catalogs.
- SPR 251-54 Packaging of Gas Stop Cocks.
- SPR 254-54 Packaging of Steel Pipe Couplings.
- SPR 256-55 Steel Outlet Boxes, Zinc or Cadmium Coated.
- SPR 262-60 Acoustical Materials.
- SPR 263-60 Standard Shapes, Sizes, Grades and Designations of Cemented Carbide Products.

Public notice of the Department's intention to withdraw these standards was published in the FEDERAL REGISTER on March 3, 1972 (37 F.R. 4459), and a 45-day period was provided for the submission of comments or objections concerning the proposed withdrawal of any of these standards. No objections to the Department's intention of withdrawing any of these standards have been received by the National Bureau of Standards.

The effective date for the withdrawal of these standards will be 60 days after the publication of this notice. This withdrawal action terminates the authority to refer to these standards as Voluntary Product Standards developed under the Department of Commerce Procedures.

Dated: April 27, 1972.

LEWIS M. BRANSCOMB,  
Director.

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**DO NOT REMOVE FROM OFFICE**

**COMMERCIAL STANDARD CS232-60**

**WITHDRAWN**

**INDUSTRIAL WIRE CLOTH**

A recorded  
voluntary standard of the  
trade published by  
the U.S. Department  
of Commerce



**For sale by the Superintendent of Documents**

**U.S. Government Printing Office, Washington 25, D.C. Price 10 cents**

**U.S. DEPARTMENT OF COMMERCE**

**Frederick H. Mueller, Secretary**

**BUSINESS AND DEFENSE SERVICES ADMINISTRATION**

**OFFICE OF TECHNICAL SERVICES**

**Commodity Standards Division**

With the cooperation of the  
National Bureau of Standards

**COMMERCIAL STANDARDS**

Commercial Standards are developed by manufacturers, distributors, and users in cooperation with the Commodity Standards Division of the Office of Technical Services, Business and Defense Services Administration, and with the National Bureau of Standards. Their purpose is to establish quality criteria, standard methods of test, rating, certification, and labeling of manufactured commodities, and to provide uniform bases for fair competition:

The adoption and use of a Commercial Standard is voluntary. However, when reference to a Commercial Standard is made in contracts, labels, invoices, or advertising literature, the provisions of the standard are enforceable through usual legal channels as a part of the sales contract.

Commercial Standards originate with the proponent industry. The sponsors may be manufacturers, distributors, or users of the specific product. One of these three elements of industry submits to the Commodity Standards Division the necessary data to be used as the basis for developing a standard of practice. The division by means of assembled conferences or letter referenda, or both, assists the sponsor group in arriving at a tentative standard of practice and thereafter refers it to the other elements of the same industry for approval or for constructive criticism that will be helpful in making any necessary adjustments. The regular procedure of the division assures continuous servicing of each Commercial Standard through review and revision whenever, in the opinion of the industry, changing conditions warrant such action.

**SIMPLIFIED PRACTICE RECOMMENDATIONS**

Under a similar procedure the Commodity Standards Division cooperates with industries in the establishment of Simplified Practice Recommendations. Their purpose is to eliminate avoidable waste through the establishment of standards of practice for sizes, dimensions, varieties, or other characteristics of specific products; to simplify packaging practices; and to establish simplified methods of performing specific tasks.

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The initial printing of C8232-60 was made possible through the cooperation of the Industrial Wire Cloth Institute.

# Industrial Wire Cloth

[Effective October 1, 1948]

## 1. PURPOSE

1.1 The purpose of this Commercial Standard is to provide a standard specification for the sizes, types, and qualities of industrial wire cloth that meet the principal demands of the trade; and to establish certain principles of manufacture and trade practices that will be mutually helpful to all concerned. Its purpose also is to promote fair marketing practices and a better understanding among manufacturers, distributors, and users.

## 2. SCOPE AND CLASSIFICATION

2.1 SCOPE—This Commercial Standard gives the sizes, types, materials, and principal dimensions of industrial wire cloth intended for general use, and for applications requiring certain heavier grades, such as sizing abrasive materials and other purposes, but excludes those types for specific or special purposes given in 2.1.1. The standard also covers definitions of special terms used by the industry, methods of measurement, applicable tolerances, methods for calculating weight and area of opening, and a test for zinc coating. Provision is included for identifying wire cloth that complies with this standard.

2.1.1 This standard does not apply to wire cloth fabrics for the following specific or special purposes:

- Testing sieve cloth <sup>1</sup>
- Insect wire screening <sup>2</sup>
- Hardware cloth <sup>2</sup>
- Fourdrinier and cylinder-facing cloth
- Diamond and spiral mesh wire cloth
- Poultry netting
- Field and chain-link fence
- Welded, woven or expanded-metal fabrics

## 2.2 CLASSIFICATION.

2.2.1 MESHES AND WEAVES.—Industrial wire cloth covered by this standard shall be of the following meshes and weaves:

- Square Mesh
- Off-Count Mesh

- Space Cloth (square openings)
- Rectangular Opening Cloth
- Plain Weave
- Twilled Weave
- Plain Dutch Weave
- Twilled Dutch Weave
- Herringbone Twill

2.2.2 METAL COMPOSITION.—Industrial wire cloth covered by this standard shall be made of primary-metal or metal-alloy wire that is suitable for weaving. The most commonly used metals and alloys are:

- Steel.—Low carbon, plain commercial finish.
- High carbon (spring) steel.—Plain commercial finish.
- Tempered (spring) steel.—Plain commercial finish.
- Galvanized before woven steel.—Coated with zinc before weaving.
- Galvanized after woven steel.—Hot-dip coated with zinc after weaving.
- Electro-galvanized after woven steel.—Electrolytically coated with zinc after weaving.
- Stainless steels.
- High brass.—70% copper, 30% zinc.
- Low brass.—80% copper, 20% zinc.
- "Commercial bronze".—90% copper, 10% zinc.
- Phosphor bronze.—Minimum tin content 1.6%.
- Copper.—Commercially pure.
- Monel.—Nickel-copper alloy.
- Nickel.
- Nickel chromium alloys.
- Aluminum.—Types 5056 and 1100.

## 3. DEFINITIONS

3.1 The following glossary covers certain terms as applied to industrial wire cloth by the trade.

### 3.1.1 WIRES.

*Warp wires.* The wires running the long way of the cloth as woven.

*Shoot wires (sometimes called filler and "shute" wires.* The wires running across the short way of the cloth as woven.

### 3.1.2 MESH AND SPACE CLOTH.

*Mesh.* The number of openings and fractional parts of an opening, per linear inch,

<sup>1</sup> ASTM Designation E11-58T, Specification for Sieves for Testing Purposes, is available from the American Society for Testing Materials, 1916 Race Street, Philadelphia 3, Pa.

<sup>2</sup> Copies of Commercial Standard CS138-55, Insect Wire Screening, and CS132-46, Hardware Cloth, are available from the Superintendent of Documents, U.S. Government Printing Office, Washington 25, D.C. Price per copy: CS138-55, 10 cents and CS132-46, 5 cents.

counting from the center of any wire to a point exactly one inch distance.

*Coarse mesh.* Wire cloth having a mesh count of less than  $30 \times 30$ .

*Medium mesh.* Wire cloth having a mesh count of  $30 \times 30$  to  $90 \times 90$ , inclusive.

*Fine mesh.* Wire cloth having a mesh count of more than  $90 \times 90$ .

*Square mesh.* Wire cloth having the same number of openings per linear inch and the same diameter of wire in the warp as in the shoot.

*Off-count mesh.* Wire cloth in which the mesh count of the shoot varies by more than 5% from that of the warp and is usually less than the warp. The diameter of the wire in the shoot may be either the same or different from that in the warp; if different, the shoot wire is usually lighter than that in the warp.

*Space cloth.* Wire cloth which is designated by the width, in inches or fractions thereof, of the open space between the inside faces of parallel wires in both the warp and shoot.

*Rectangular opening cloth.* Wire cloth in which measurement of the openings between the shoot wires are greater or smaller than the openings in the warp.

### 3.1.3 WEAVES.

*Plain weave.* Wire cloth in which each warp wire and each shoot wire passes over one and under the next adjacent complementary wire in both directions (see fig. 1).

*Twilled weave.* Wire cloth in which each shoot wire passes successively over two and under two warp wires and each warp wire passes successively over two and under two shoot wires (see fig. 2).

*Plain dutch weave.* Wire filter cloth the pattern of which is the same as in plain weave except that the warp wires are heavier than the shoot wires and the shoot wires are driven up close, resulting in tapered or wedge-shaped openings instead of square openings (see fig. 3).

*Twilled dutch weave.* A combination of twilled and dutch weaves (see fig. 4).

*Herringbone twill.* Wire cloth where the direction of a twilled weave is reversed at regular intervals to produce a striped or herringbone effect (see fig. 5).

### 3.1.4 CRIMPS.

*Double crimp.* Corrugations in both warp and shoot wires to lock wire in position (see fig. 6.)

*Pre-crimp.* Any woven wire cloth with both warp and shoot wires crimped before weaving.

*Intermediate crimp.* Woven wire cloth with extra crimps or corrugations between the

points of intersection. Sometimes called "Inter-Crimp" and/or "Multiple" crimp.

Either or both the warp and shoot wires may be intermediate crimped (see fig. 7).

*Lock crimp.* Woven wire cloth with deep crimps at points of intersection to lock wires securely in place (see fig. 8).

*Smooth top.* Woven wire cloth with deep crimps, as in lock crimp cloth, except that all crimps are on the under side of the cloth, leaving the top wearing surface all in one plane or flat level surface (see fig. 9).

## 4. REQUIREMENTS

4.1 MESH AND WIRE SIZES.—Industrial wire cloth, when practicable, shall be made in the combinations of standard mesh sizes, or space openings, and wire diameters given in tables I, II and III. For combinations of mesh sizes, space openings and wire diameters other than those listed in tables I, II and III, the manufacturer's approval as to feasibility of weaving should be obtained.

4.1.1 WIRE SIZE.—Wire sizes shall be expressed in decimals of an inch.

4.1.2 MESH SIZES.—Mesh sizes for wire mesh cloth shall be expressed in count (number of openings) and fractions thereof per lineal inch: viz.,  $30 \times 30$  mesh,  $2\frac{1}{2} \times 2\frac{1}{2}$  mesh, etc. (see tables I and II and 3.1.2).

4.1.3 OPENINGS (SPACE CLOTH).—Openings of wire space cloth shall be expressed in inches, decimals or fractions of an inch: viz.,  $\frac{1}{8}$  inch space, 0.054 inch wire,  $2\frac{1}{4}$  inch space, 0.375 inch wire, etc. (see table III and 3.1.2).

4.1.4 DUTCH WEAVE.—The wire diameter and mesh in each direction shall be specified for dutch weave cloth subject to the vendor's approval as to practicability of weaving.

4.1.5 WIDTH.—Width of wire cloth shall be expressed in inches and fractions thereof. In the case of selvaged cloth (see 4.2), measurement of the width shall be from the outside of the loop on one selvege to the outside of the loop of the opposite selvege.

### 4.1.6 LENGTH.

4.1.6.1 FULL ROLLS.—Full rolls of industrial wire cloth shall have a nominal length of 100 linear feet. Each roll shall consist of not more than three pieces of wire cloth, with no piece less than 10 linear feet in length (see 4.3.7.1).

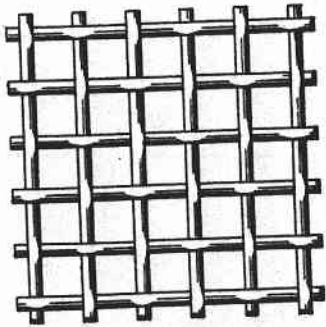
4.1.6.2 CUT LENGTHS.—When specified the industrial wire cloth shall be furnished in lengths cut or trimmed to specific dimensions (see 4.3.7.2).

4.2 SELVAGES.—The wire cloth shall be furnished either with or without selvaged edges, according to the practicability of manufacture.

### 4.3 TOLERANCES.

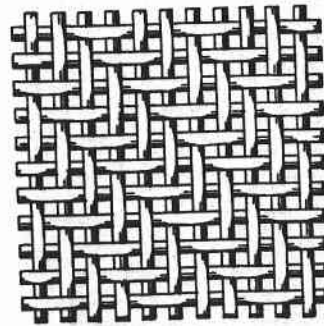
4.3.1 WIRE DIAMETER.—Tolerances for wire diameters before weaving shall be in accordance with table IV.

# WEAVES



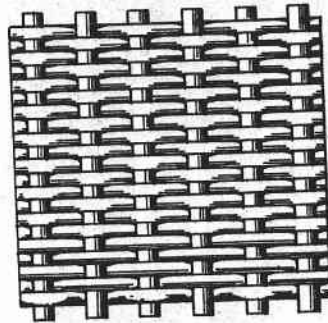
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**Plain Weave**  
Figure 1



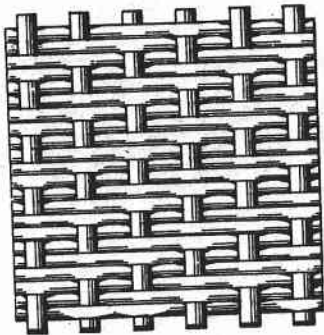
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**Twilled Weave**  
Figure 2



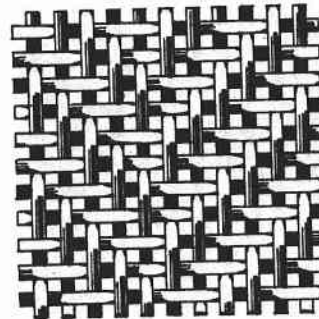
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**Plain Dutch Weave**  
Figure 3



(End View)

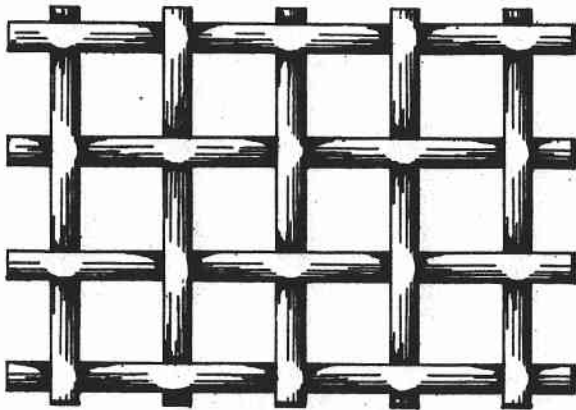
**Twilled Dutch Weave**  
Figure 4



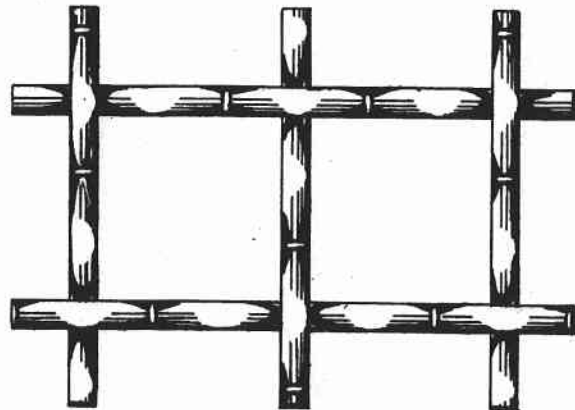
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**Herringbone Twill**  
Figure 5

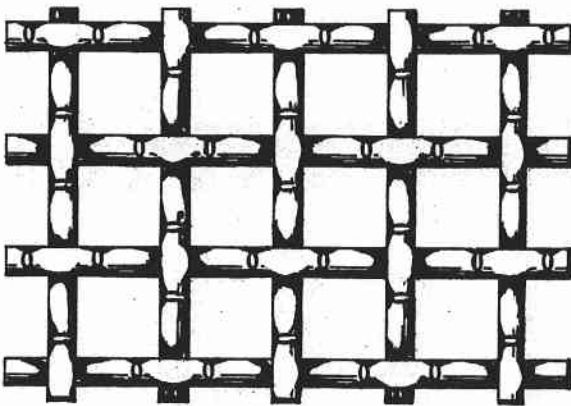
# CRIMPS



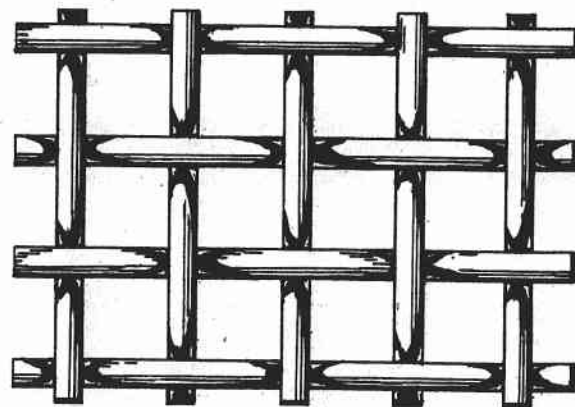
(End View)  
Double Crimp  
Figure 6



(End View)  
Intermediate Crimp  
Figure 7



(End View)  
Lock Crimp  
Figure 8



(End View)  
Smooth Top  
Figure 9



TABLE I.—Mesh cloth, sizes most frequently produced for general use<sup>1</sup>

Mesh	Wire diameter	Opening	Open area	Mesh	Wire diameter	Opening	Open area
	<i>Inch</i>	<i>Inch</i>	<i>Percent</i>		<i>Inch</i>	<i>Inch</i>	<i>Percent</i>
1×1	0.080	0.920	84.6	30×30	0.013	0.0203	37.1
2×2	.063	.437	78.4	35×35	.011	.0176	37.9
3×3	.054	.279	70.1	40×40	.010	.0150	36.0
4×4	.047	.203	65.9	50×50	.009	.0110	30.3
5×5	.041	.159	63.2	60×60	.0075	.0092	30.5
6×6	.035	.132	62.7	80×80	.0055	.0070	31.4
8×8	.028	.097	60.2	100×100	.0045	.0055	30.3
10×10	.025	.075	56.3	120×120	.0037	.0046	30.7
12×12	.023	.060	51.8	150×150	.0026	.0041	37.4
14×14	.020	.051	51.0	180×180	.0023	.0033	34.7
16×16	.018	.0445	50.7	200×200	.0021	.0029	33.6
18×18	.017	.0386	48.3	250×250	.0016	.0024	36.0
20×20	.016	.0340	46.2	270×270	.0016	.0021	32.2
24×24	.014	.0277	44.2	325×325	.0014	.0017	30.0

<sup>1</sup> Wire sizes other than those listed may be specified subject to vendor's approval as to practicability of weaving.TABLE II.—Mesh cloth, heavier grades<sup>1</sup>

Mesh	Medium light			Medium			Medium heavy			Heavy		
	Wire diameter	Opening	Open area	Wire diameter	Opening	Open area	Wire diameter	Opening	Open area	Wire diameter	Opening	Open area
1×1	<i>Inch</i> 0.105	<i>Inch</i> 0.895	<i>Percent</i> 80.1	<i>Inch</i> 0.135	<i>Inch</i> 0.865	<i>Percent</i> 74.8	<i>Inch</i> 0.162	<i>Inch</i> 0.838	<i>Percent</i> 70.2	<i>Inch</i> 0.207	<i>Inch</i> 0.793	<i>Percent</i> 62.9
2×2	.080	.420	70.6	.105	.395	62.4	.135	.365	53.3	.177	.323	41.7
2½×2½	.080	.320	64.0	.105	.295	54.4	.135	.265	43.9	.148	.252	39.7
3×3	.072	.261	61.3	.092	.241	52.3	.120	.213	40.8	.135	.198	35.3
4×4	.063	.187	56.0	.080	.170	46.2	.105	.145	33.6	.120	.130	27.0
5×5	.047	.153	58.5	.063	.137	46.9	.072	.128	41.0	.080	.120	36.0
6×6	.047	.120	51.8	.054	.113	46.0	.063	.104	38.9	.080	.087	27.2
8×8	.035	.090	51.8	.041	.084	45.2	.047	.078	38.9	.063	.062	24.6
10×10	.028	.072	51.8	.032	.068	46.2	.035	.065	42.3	.047	.053	28.1
12×12	.025	.058	48.4	.028	.055	43.6	.032	.051	37.5	.041	.042	25.4
14×14	.023	.048	45.2	.025	.046	41.5	.028	.043	36.2	.035	.036	25.4
16×16	.020	.0425	46.2	.023	.0395	39.9	.025	.0375	36.0	.028	.0345	30.5
18×18	.018	.0376	45.8	.020	.0356	41.1	.023	.0326	34.4	.028	.0276	24.7
20×20	.017	.0330	43.6	.018	.032	41.0	.020	.030	36.0	.025	.025	25.0
24×24	.015	.0267	41.1	.016	.0257	38.0	.018	.0237	32.4	.020	.0217	27.1
30×30	.013	.0203	37.1	.0135	.0198	35.3	.015	.0183	30.1	.016	.0173	26.9
35×35	.010	.0176	37.9	.012	.0166	33.8	.0135	.0151	27.9	.015	.0136	22.7
40×40	.010	.0150	36.0	.011	.014	31.4	.012	.0130	27.0	.0135	.0115	21.2

<sup>1</sup> Wire sizes other than those listed may be specified subject to vendor's approval as to practicability of weaving.

TABLE III.—Space cloth for sizing of abrasive materials<sup>1</sup>

Opening	Medium light		Medium		Medium heavy		Heavy	
	Wire diameter	Open area	Wire diameter	Open area	Wire diameter	Open area	Wire diameter	Open area
	<i>Inch</i>	<i>Percent</i>	<i>Inch</i>	<i>Percent</i>	<i>Inch</i>	<i>Percent</i>	<i>Inch</i>	<i>Percent</i>
1/16"	0.035	42.3	0.041	37.0	0.047	33.2	0.063	24.6
3/32"	.041	47.6	.047	45.2	.063	35.0	.080	29.6
1/8"	.054	48.7	.072	40.2	.092	33.4	.105	29.5
5/32"	.063	51.2	.080	43.5	.105	36.0	.120	32.2
3/16"	.080	49.1	.092	45.1	.120	37.2	.135	33.8
1/4"	.105	49.6	.120	45.6	.135	42.2	.148	39.4
5/16"	.120	52.2	.135	48.8	.148	46.0	.162	43.4
3/8"	.135	54.1	.148	51.4	.162	48.7	.177	46.1
7/16"	.148	55.8	.162	53.2	.177	50.7	.192	48.3
1/2"	.162	57.1	.177	54.5	.192	52.2	.207	49.8
5/8"	.162	61.0	.177	57.6	.192	55.0	.225	50.7
3/4"	.177	60.7	.192	58.5	.225	54.0	.250	51.0
7/8"	.192	63.4	.207	61.4	.250	56.3	.3125	49.8
1"	.207	65.3	.225	63.3	.250	60.5	.3125	54.3
1 1/8"	.225	66.6	.250	64.0	.3125	58.0	.375	52.9
1 1/4"	.225	69.6	.250	67.0	.3125	61.0	.375	55.7
1 1/2"	.250	69.4	.3125	64.0	.375	59.2	.4375	54.8
1 3/4"	.250	71.5	.3125	66.5	.375	61.6	.4375	57.5
1 7/8"	.250	73.4	.3125	68.5	.375	64.0	.500	56.3
2"	.3125	71.9	.375	67.8	.4375	64.0	.500	60.5
2 1/4"	.3125	74.8	.375	70.9	.500	64.0	.625	58.0
2 1/2"	.375	73.4	.4375	70.1	.500	66.9	.625	61.2
2 3/4"	.375	75.6	.4375	72.4	.500	69.4	.625	64.0
2 7/8"	.375	77.4	.4375	74.4	.500	71.6	.625	66.4
3"	.4375	76.2	.500	73.5	.625	68.5	.750	64.0
3 1/4"	.4375	79.0	.500	76.6	.625	72.0	.750	67.8
4"	.500	79.0	.625	74.8	.750	70.9	1.000	64.0

<sup>1</sup> Wire sizes other than above may be specified subject to vendor's approval as to practicability of weaving.

TABLE IV.—Tolerances for wire diameters

Carbon steel		Stainless steel and all nonferrous	
Wire diameter	Tolerance (plus or minus)	Wire diameter	Tolerance (plus or minus)
<i>Inch</i>	<i>Inch</i>	<i>Inch</i>	<i>Inch</i>
0.500 & Coarser.....	0.003	0.500 & Coarser.....	0.002
.4375 to 0.080 incl.....	.002	.4375 to 0.063 incl.....	.0015
.072 to .035 incl.....	.001	.054 to .047 incl.....	.001
.032 to .028 incl.....	.0008	.041.....	.0008
.025 to .020 incl.....	.0006	.035.....	.00075
.018 to .016 incl.....	.0005	.032.....	.0006
.015 to .011 incl.....	.0004	.028 to .020 incl.....	.0005
.010 to .006 incl.....	.0003	.018 to .012 incl.....	.0004
.0055 to .0045 incl.....	.0002	.011 to .008 incl.....	.0003
		.0075 to .0045 incl.....	.00025

4.3.2 MESH COUNT.—The tolerances in mesh applied separately in the direction of the warp and shoot of wire mesh cloth, except for dutch weave, shall be in accordance with table V.

4.3.3 SPACE CLOTH.—The tolerances for measurement of openings in wire space cloth, applied separately in the direction of the warp and shoot, shall be in accordance with table VI.

4.3.4 OFF-COUNT MESH.—The tolerances shall be the same as for square mesh cloth (see 4.3.2).

4.3.5 RECTANGULAR MESH.—The tolerances shall be the same as for space cloth (see 4.3.3).

TABLE V.—Tolerances in mesh

Mesh sizes	Tolerances in average mesh count	
	Warp wires (plus or minus)	Shoot wires (plus or minus)
30 mesh and coarser.....	<i>Percent</i>	<i>Percent</i>
Finer than 30, but not finer than 200.....	2	5
Finer than 200.....	2	4
	3	4

TABLE VI.—Tolerances on openings for space cloth

Openings	Tolerance (plus or minus)
<i>Inches</i>	<i>inch</i>
1/16 to 1/8 incl.	0.007
Over 1/16 to 3/16 incl.	.010
Over 3/16 to 1/4 incl.	.012
Over 1/4 to 5/16 incl.	.015
Over 5/16 to 3/8 incl.	.017
Over 3/8 to 1/2 incl.	.020
Over 1/2 to 5/8 incl.	.030
Over 5/8 to 1.	.045
Over 1 to 1 1/2 incl.	.075
Over 1 1/2 to 3 incl.	.100
Over 3.	.100

4.3.6 WIDTH.—Permissible tolerance in the width of standard industrial wire cloth except when cut to specific dimension, shall be in accordance with table VII (see also 4.1.5).

#### 4.3.7 LENGTH

4.3.7.1 FULL ROLLS.—The total length of industrial wire cloth furnished, except when cut to specific dimensions (see 4.1.6.2), shall be within plus or minus 10% of the length ordered (see 4.1.6.1). The invoice shall be based on actual length furnished.

4.3.7.2 CUT LENGTHS.—Permissible tolerance in length dimension of cut pieces of trimmed cloth (see 4.1.6.2) shall be plus or minus 1/8 inch or one wire thickness, whichever is greater.

#### 4.4 CALCULATED WEIGHTS OF CLOTH AND WIRE.

4.4.1 PLAIN OR TWILLED WEAVE.—The approximate weight in pounds per square foot shall be determined by means of the following formula:

$$\text{Approximate weight per square foot} = 24 \times M \times W \times \sqrt{1 + (DM)^2}$$

(M=mesh; W=weight of bare wire in pounds per lineal foot; D=diameter of wire)

(Exceptions: Where the size of wire is equal to or greater than the width of the opening, to compensate for an unavoidable condition which develops in the above formula, a deduction of 5% shall be made from the full calculated weight.)

4.4.2 OFF-COUNT AND ODD-SIZE CLOTH.—The weight in pounds shall be determined by averaging the weights of the two sizes of mesh and/or wire involved as determined by means of the formula in 4.4.1.

4.4.3 SPACE CLOTH.—The weight in pounds shall be determined by the formula in 4.4.1, except that the space or clear opening shall be converted into a "mesh" equivalent by adding the wire size to the measurement of the clear opening and dividing that sum into one.

TABLE VII.—Tolerances in the width of industrial wire cloth

Mesh sizes	Tolerances in width
	<i>inch</i>
5 mesh and coarser	1/4
6 to 50 mesh	1/8
Finer than 50 mesh	1/16

4.4.4 STEEL WIRE.—The weight in pounds of any size of steel wire per lineal foot shall be determined by means of the following formula:

$$\text{Weight per lineal foot of wire} = D^2 \times 12 \times 0.7854 \times 0.283$$

(D=diameter in inches; 12=length in inches; 0.7854=conversion factor for area of circles; 0.283=density of steel in pounds per cubic inch.)

4.4.5 ALLOY OR NONFERROUS WIRE.—The weight in pounds shall be determined by means of the above formula (4.4.4), substituting densities as indicated below:

Steel (including stainless)	0.283
Copper	.322
70/30 High Brass	.308
80/20	.313
90/10 Commercial Bronze	.318
Phosphor Bronze	.318
Monel	.318
Nickel	.319
5056 Aluminum	.096

4.5 WIDTH OF OPENING.—The width of opening of industrial wire cloth shall be determined by means of the following formula:

$$\text{Width of opening} = \frac{1 - DM}{M}$$

(D=wire diameter; M=mesh)

4.6 OPEN AREA.—The percentage of open area of industrial wire cloth, except space cloth (see 4.6.1), shall be determined by means of the following formula:

$$\text{Percentage of open area} = \left( \frac{OM}{1} \right)^2 \times 100 = (OM)^2 \times 100$$

(O=size of opening; M=mesh)

4.6.1 OPEN AREA, SPACE CLOTH.—The percentage of open area for space cloth shall be determined by means of the following formula:

$$\text{Percentage of open area} = \left( \frac{O}{O+D} \right)^2 \times 100$$

(O=size of opening; D=diameter)

#### 4.7 ZINC-COATING.

4.7.1 HOT-DIP GALVANIZED WIRE CLOTH.—The adequacy of the zinc coating on carbon steel industrial wire cloth, galvanized before and after weaving by the hot-dip process, shall be determined by means of the Preece test as set forth in American Society of Testing Materials Specification A90-53.<sup>3</sup> The minimum number of 1-minute immersions required shall be in accordance with table VIII.

4.7.2 ELECTRO-GALVANIZED WIRE CLOTH.—The amount of zinc on industrial wire cloth, coated by the electrolytic method, after weaving, shall be equivalent to at least 5 percent of the weight of the bare steel wire used for weaving the cloth.

<sup>3</sup> Obtainable from ASTM; see page 3, footnote 1.

TABLE VIII.—Number of 1-minute immersions required for zinc coating

Galvanized before weaving		Galvanized after weaving	
Diameter of Wire	Immersions	Diameter of Wire	Immersions
<i>Each</i> 0.009 to 0.0479	1	<i>Each</i> 0.014 to 0.0199	1
.048 to .0549	1	.020 to .0259	1½
.055 to .0635	1½	.026 to .0499	2
.064 and heavier	2	.050 to .0639	2½
		.064 to .0809	3
		.081 and heavier	3½

4.8 WORKMANSHIP.—Industrial wire cloth shall be made of high-grade materials and with good workmanship. It shall be free from any defects that might affect its serviceability.

## 5. PACKAGING

5.1 Unless otherwise specified, industrial wire cloth shall be prepared for shipment to permit acceptance by carrier for safe transportation at the lowest applicable rate.

## 6. IDENTIFICATION

6.1 LABELS AND LITERATURE.—In order that purchasers may be assured that the industrial wire cloth actually complies with all requirements of this Commercial Standard, it is recommended that manufacturers include the following statement in conjunction with their name and address on labels, invoices, sales literature, etc.:

This wire cloth complies with Commercial Standard CS232-60, as developed by the trade, under the procedure of the Commodity Standards Division, and issued by the U.S. Department of Commerce.

6.2 The following abbreviated statement is suggested when available space on labels is insufficient for the full statement:

Complies with CS 232-60, as developed by the trade, and issued by the U.S. Department of Commerce.

## 7. EFFECTIVE DATE

7.1 Having met all procedural requirements of the Commodity Standards Division, including approval by the acceptors hereinafter listed, this Commercial Standard was issued by the U.S. Department of Commerce effective October 1, 1960.

## HISTORY OF PROJECT

In a letter dated August 29, 1958, The Industrial Wire Cloth Institute requested the cooperation of the Commodity Standards Division in the establishment of a Commercial Standard for Industrial Wire Cloth, and submitted as a basis for the standard a tentative standard developed by that organization.

The Commodity Standards Division circulated copies of the proposed Commercial Standard to representative producers, testing laboratories, users and Government agencies for constructive comment. All comments and suggestions received were carefully considered and adjustments were made to the proposal to satisfy the comment wherever practicable. The recommended Commercial Standard, TS-5476, was circulated to the trade on March 7, 1960, for acceptance.

On September 1, 1960, the Commodity Standards Division announced that acceptances had been received representing a satisfactory majority of the industry and the Commercial Standard, to be designated CS232-60 would be considered effective October 1, 1960.

Project Manager: D. R. Stevenson, Commodity Standards Division Office of Technical Services.

Technical Adviser: Dr. L. V. Judson, Office of Weights and Measures National Bureau of Standards.

## STANDING COMMITTEE

The following individuals comprise the membership of the standing committee, which is to review, prior to circulation for acceptance, revisions proposed to keep the standard abreast of progress. Comment concerning the standard and suggestions for revision may be addressed to any member of the committee or to the Commodity Standards Division, Office of Technical Services, United States Department of Commerce which acts as secretary for the committee.

- J. L. CAMPBELL, Newark Wire Cloth Co., 351 Verona Ave., Newark 4, N.J. (chairman)
- D. W. KRUEGER, Chase Brass & Copper Co., Inc., 55-60 58th St., Maspeth 78, N.Y.
- F. G. HOTT, Hoyt Wire Cloth Co., Abraso St., Lancaster, Pa.
- DUNCAN C. DOBSON, Ludlow-Saylor Wire Cloth Co., 4333 West Clayton Ave., St. Louis, Mo.
- DELMAR L. BLOEM, National Sand & Gravel Association, 1411 K St., NW., Washington, D.C.
- FRANK E. BASTIAN, Reynolds Wire Division, National Standard Co., Dixon, Ill.
- ALBERT E. REED, W. S. Tyler Co., 3615 Superior Ave., Cleveland, Ohio.
- A. F. MAXFIELD, United States Testing Co., Inc., 1415 Park Ave., Hoboken, N.J.

**ACCEPTANCE OF COMMERCIAL  
STANDARD**  
**CS232-60, Industrial Wire Cloth**

**WITHDRAWN**

If acceptance has not previously been filed, this sheet properly filled in, signed, and returned will provide for the recording of your organization as an acceptor of this Commercial Standard.

Date \_\_\_\_\_

Commodity Standards Division  
Office of Technical Services  
Business and Defense Services Administration  
U. S. Department of Commerce  
Washington 25, D. C.

Gentlemen:

We believe that this Commercial Standard constitutes a useful standard of practice, and we individually plan to utilize it as far as practicable in the

production<sup>1</sup>      distribution<sup>1</sup>      purchase<sup>1</sup>      testing<sup>1</sup>

of this commodity.

We reserve the right to depart from the standard as we deem advisable.

We understand, of course, that only those articles which actually comply with the standard in all respects can be identified or labeled as conforming thereto.

Signature of authorized officer \_\_\_\_\_

(In ink)

(Kindly typewrite or print the following lines)

Name and title of above officer \_\_\_\_\_

Organization \_\_\_\_\_

(Fill in exactly as it should be listed)

Street address \_\_\_\_\_

City, zone, and State \_\_\_\_\_

<sup>1</sup> Underscore the applicable words. Please see that separate acceptances are filed for all subsidiary companies and affiliates which should be listed separately as acceptors. In the case of related interest, trade associations, trade papers, etc., desiring to record their general support, the words "General support" should be added after the signature.

(Cut on this line)

## TO THE ACCEPTOR

The following statements answer the usual questions arising in connection with the acceptance and its significance:

1. *Enforcement.*—Commercial Standards are commodity specifications voluntarily established by mutual consent of those concerned. They present a common basis of understanding between the producer, distributor, and consumer and should not be confused with any plan of governmental regulation or control. The United States Department of Commerce has no regulatory power in the enforcement of their provisions, but since they represent the will of the interested groups as a whole, their provisions through usage soon become established as trade customs, and are made effective through incorporation into sales contracts by means of labels, invoices, and the like.

2. *The acceptor's responsibility.*—The purpose of Commercial Standards is to establish, for specific commodities, nationally recognized grades or consumer criteria, and the benefits therefrom will be measurable in direct proportion to their general recognition and actual use. Instances will occur when it may be necessary to deviate from the standard and the signing of an acceptance does not preclude such departures; however, such signature indicates an intention to follow the standard, where practicable, in the production, distribution, or consumption of the article in question.

3. *The Department's responsibility.*—The major function, performed by the Department of Commerce in the voluntary establishment of Commercial Standards on a nationwide basis is fourfold: First, to act as an unbiased coordinator to bring all interested parties together for the mutually satisfactory adjustment of trade standards; second, to supply such assistance and advice as past experience with similar programs may suggest; third, to canvass and record the extent of acceptance and adherence to the standard on the part of producers, distributors, and users; and fourth, after acceptance, to publish and promulgate the standard for the information and guidance of buyers and sellers of the commodity.

4. *Announcement and promulgation.*—When the standard has been endorsed by a satisfactory majority of production or consumption in the absence of active, valid opposition, the success of the project is announced. If, however, in the opinion of the standing committee or of the Department of Commerce, the support of any standard is inadequate, the right is reserved to withhold promulgation and publication.



## ACCEPTORS

The manufacturers, distributors, users and others listed below have individually indicated in writing their acceptance of this Commercial Standard prior to its publication. The acceptances indicate an intention to utilize the standard as far as practicable, but reserve the right to depart from it as may be deemed desirable. The list is published to show the extent of recorded public support for the standard, and should not be construed as indicating that all products made by the acceptors actually comply with its requirements.

Products that meet all requirements of the standard may be identified as such by a certificate, grade mark, or label. Purchasers are encouraged to require such specific evidence of compliance, which may be given by the manufacturer whether or not he is an acceptor.

## ASSOCIATIONS

### (GENERAL SUPPORT)

National Limestone Institute, Washington, D.C.  
National Sand & Gravel Association, Washington, D.C.  
Purchasing Agents Association of North Jersey, New Brunswick, N.J.

### FIRMS AND OTHER INTERESTS

Abbey-Scherer Co., The, El Monte, Calif.  
Abrasive Shot & Grit Co., Inc., Springfield, N.Y.  
Allis-Chalmers Manufacturing Co., West Allis, Wis.  
American Graded Sand Co., Chicago, Ill.  
American Standards Testing Bureau, Inc., New York, N.Y.  
Atlantic Wire Co., The, Branford, Conn.  
Audubon Wire Cloth Division, Manganese Steel Forge Co., Philadelphia, Pa.

Bartlett, C. O., & Snow Co., The, Cleveland, Ohio.  
Belleville Wire Cloth Co., Inc., Belleville, N.J.  
Blaw-Knox Co., Bufovak Equipment Div., Buffalo, N.Y.  
Blue Channel Corp., The, Port Royal, S.C.  
Buffalo Slag Co., Inc., The, Buffalo, N.Y.

California Testing Laboratories, Inc., Los Angeles, Calif.  
Cambridge Wire Cloth Co., The, Cambridge, Md.  
Central Steel & Wire Co., Chicago, Ill.  
Chain Bolt Co., Milwaukee, Wis.  
Chase Brass & Copper Co., Inc., Maspeth, N.Y.  
Cheney Bigelow Wire Works, Springfield, Mass.  
Chicago Wheel & Manufacturing Co., Chicago, Ill.  
Chrysler Corp., Detroit, Mich.  
City Wire & Iron Works, Inc., Los Angeles, Calif.  
Cleveland Wire Cloth & Manufacturing Co., The, Cleveland, Ohio.  
Cole-Roscoe Manufacturing Co., The, South Norwalk, Conn.  
Colorado Fuel & Iron Corp., The, Denver, Colo.  
Colorado Fuel & Iron Corp., Pacific Coast Division, Oakland, Calif.  
Crager Wire & Iron Works, Salt Lake City, Utah.  
Crippen Laboratories, Inc., Div. of Foster D. Snell, Inc., Baltimore, Md.  
Cuthbert Wire Cloth Co., Philadelphia, Pa.

Darby, Edward J., & Son, Inc., Philadelphia, Pa.  
Davidson-Kennedy Co., Atlanta, Ga. (General Support).  
Decatur Iron & Steel Co., Decatur, Ala.  
Deister Concentrator Co., Inc., The, Fort Wayne, Ind.  
DeLaval Separator Co., The, Foughkeepsie, N.Y.  
Derrick Manufacturing Co., Buffalo, N.Y.  
Detroit Testing Laboratory, Inc., The, Detroit, Mich.  
Diehl-Ellis, Inc., Woodhaven, N.Y.  
Donner-Hanna Coke Corp., Buffalo, N.Y.  
Dravo Corp., Keystone Division, Pittsburgh, Pa.

East St. Louis Stone Co., East St. Louis, Ill.

Ferguson Perforating & Wire Co., Providence, R.I.

General Wire Products Co., Philadelphia, Pa.  
Gifford-Hill & Co., Inc., Dallas, Tex.  
Gilbert & Bennett Manufacturing Co., The, Georgetown, Conn.

Hanover Wire Cloth Division, Continental Copper & Steel Industries, Inc., Hanover, Pa.  
Hayden Wire Works, Inc., The, West Springfield, Mass.  
Hirzel, Charles K., A.I.A., Architect, New York, N.Y. (General Support)  
Hoyt Wire Cloth Co., Lancaster, Pa.

Industrial Wire Products Corp., Los Angeles, Calif.  
International Harvester Co., Chicago, Ill.  
International Salt Co., Clarks Summit, Pa.

Jeffrey Manufacturing Co., The, Columbus, Ohio.  
Jelliff, C. O., Manufacturing Corp., The, Southport, Conn.  
Jones, L. E., Wire & Iron Works, Inc., Baltimore, Md.

Kentucky Metal Products Co., Louisville, Ky.  
Keystone Portland Cement Co., Philadelphia, Pa.

Ludlow-Saylor Wire Cloth Co., St. Louis, Mo.

Manganese Steel Forge Co., Philadelphia, Pa.  
Michigan Wire Cloth Co., Detroit, Mich.  
Morton Salt Co., Chicago 6, Ill.

National Lime & Stone Co., The, Findlay, Ohio.  
Newark Wire Cloth Co., Newark, N.J.  
New York Wire Cloth Co., York, Pa.

Oklahoma Testing Laboratories, Oklahoma City, Okla.  
Oliver Corp., The, Battle Creek, Mich.  
Omaha Testing Laboratories, Omaha, Nebr.  
Ornamental Iron Work Co., The, Akron, Ohio.

Pacific Wire Products Co., Compton, Calif.  
Patzig Testing Laboratories, Des Moines, Iowa.  
Pequot Wire Cloth Co., Div. of Hudson Wire Co., Norwalk, Conn. (General Support).  
Philadelphia Coke Division, Eastern Gas & Fuel Associates, Philadelphia, Pa.  
Phoenix Wire Works, Inc., Detroit, Mich.  
Pickands Mather & Co., Duluth, Minn.

Radio Corporation of America, Camden, N.J.  
Revere Copper & Brass, Inc., Rome, N.Y.  
Reynolds Wire Division, National-Standard Co., Dixon, Ill.  
Rhodes, James H., & Co., Chicago, Ill.  
Ripley Screen & Strainer Co., Collierville, Tenn.  
River Products Co., Iowa City, Iowa.

Screen Equipment Co., Inc., Buffalo 25, N.Y.  
Sherwatt Equipment & Manufacturing Co., Inc., New York, N.Y.  
Smith, F. P., Wire & Iron Works, Chicago, Ill.  
Smith, John P., Co., The, New Haven, Conn.  
Sprout Waldron & Co., Inc., Muncy, Pa.  
St. Louis Testing Laboratories, Inc., St. Louis, Mo.  
Standard Slag Co., The, Youngstown, Ohio.  
Star Wire Screen & Iron Works, Inc., Los Angeles, Calif.  
Stokes, F. J., Corp., Philadelphia, Pa.  
Studebaker-Packard Corp., South Bend, Ind.  
Sturtevant Mill Co., Boston, Mass.  
Surface Combustion Division, Midland-Ross Corp., Toledo, Ohio.  
Syntrol Co., Homer City, Pa.

Twin City Testing & Engineering Laboratory, Inc., St. Paul, Minn.  
Twining Laboratories, Inc., The, Fresno, Calif.  
Tyler, W. S., Co., The, Cleveland, Ohio.

Unique Wire Weaving Co., Inc., Hillside, N.J.  
United States Testing Co., Inc., Hoboken, N.J.  
Universal Vibrating Screen Co., Racine, Wis.

Watts Corp., The, Roebing, N.J.  
Wayne Wire Cloth Products, Inc., Kalkaska, Mich.  
Wellman Engineering Co., The, Cleveland, Ohio.  
Western Fence & Wire Works, Inc., Portland, Oreg.  
Western Machinery Co., Wemco Div., San Francisco, Calif.  
Wickwire Brothers, Inc., Cortland, N.Y.  
Wilkins, J. D., Co., Greensboro, N.C.  
William Brand Rex Division, American Enka Corp., Concord, Mass.  
Willis Motors, Inc., Toledo, Ohio.  
Wiretex Manufacturing Co., Inc., Bridgeport, Conn.  
Wood, Alan, Steel Co., Conshohocken, Pa.  
Wright, G. F., Steel & Wire Co., Worcester, Mass.

## U.S. GOVERNMENT

Atomic Energy Commission, Property & Supply Management Branch  
Division of Construction & Supply, Washington, D.C.  
Brookley Air Force Base, Standardization Branch, Mobile, Ala.  
Department of the Army, Washington, D.C.  
Department of Health, Education, & Welfare, Procurement & Supply Management Branch, Washington, D.C.  
Department of the Interior, Division of Property Management, Washington, D.C.  
Veterans Administration, Washington, D.C.